Attachment

DOE Staff Comments on EPA BACT Guidance for Natural Gas Combined Cycle Power Systems

Background

EPA has offered for public comment its August 4, 2000, draft guidance on BACT for NOx control for combined cycle turbines (65FR50202; August 17, 2000). The draft guidance recognizes the multiple benefits of deploying new combined cycle natural gas power systems, and is intended to assist State permitting authorities in setting an appropriate level for ABest Available Control Technology,@ or BACT, when issuing a construction permit to a new powerplant of this type seeking to site in a Aclean area.@ In particular, the guidance discusses the relevant factors in determining whether or not a new class of inherently low NOx natural gas power systems should universally be required to install Selective Catalytic Reduction (SCR) control systems to reduce NOx emissions further. The draft guidance states:

In most cases best available control technology (BACT) for controlling NOx emissions from combined cycle natural gas turbines used to generate electricity is a concentration that is achieved by selective catalytic reduction (SCR). This is true at all combined cycle natural gas plants including those that use a variant of the technology called dry low NOx (DLN) turbines that can achieve less than 10 parts per million NOx emissions without add on controls. In some situations, however, the collateral environmental impacts associated with the use of ammonia with SCR may justify not requiring SCR on DLN turbines. ... It is the permit applicant=s obligation to present information on any impacts, specific to the installation of SCR on the unit being permitted, that he wishes to be considered in the BACT determination.

The draft guidance presents a set of environmental impacts from NOx, or from ammonia emissions associated with SCR systems, including:

Tropospheric Ozone
Fine Particles
Acidifying Deposition
Nitrogen Deposition and Eutrofication

Global Warming and Stratospheric Ozone Depletion
Ammonia Safety
Waste Issues

A subsequent discussion addresses the impact of requiring SCR, in the context of the overall electric power system, as modeled by EPA for its Clean Air Power Initiative (the ACAPI@ program). This discussion concludes that requiring SCR on all combined cycle combustion turbines has the counter-intuitive result of increasing NOx emissions.

Discussion

This paper does not address in detail the generally excellent technical discussion presented in the draft EPA guidance document. However, certain points merit elaboration, as discussed below.

Lower Systems Emissions

The 1999 CAPI modeling assumed that traditional gas turbines either had SCR, or did not. The assumption projects the deployment of traditional turbines, not inherently low NOx turbines. These low NOx turbines reduce NOx emissions by roughly 65% on a heat input basis, and by even more on an electrical output basis due to their higher efficiency, compared to traditional units without SCR. Thus, the CAPI results presented by EPA in the draft guidance document in Exhibit 2 and accompanying text overstate NOx emissions in the case where SCR is not required for gas turbines. Nevertheless, EPA=s analysis strongly supports the point that the cost of producing electricity does matter, and that A... if these turbines must use SCR, more electricity will be produced by dirtier plants and therefore total NOx emissions would increase, not decrease.@

The difference in emissions between a 9 ppmv combined cycle natural gas system and even a very clean coal system (0.15 #NOx/mmBtu) is substantial. Based on information provided us by GE, its newly commercialized AH-frame@ turbine technology emits 85% less NOx than levels budgeted under the EPA NOx SIP call for coal units.

In the same sense, other emissions from these dirtier plants, including particulate matter, mercury and other trace metals, and sulfur dioxide, will also be greater if SCR is universally required on all combined cycle combustion turbines.

Chilling R&D in Technology Advancement

DOE is continuing its proven partnership with the private sector to develop even more improved levels of efficiency and environmental performance in advanced turbines. We have been told by our private sector partners that their limited R&D resources will not be committed to further NOx reduction advancements if the expected result is that even cleaner systems will be required to apply post-combustion cleanup.

Global Implications for Technology Deployment

Besides the obvious benefits cited by EPA regarding pollution prevention versus pollution control, the Agency should consider the global implications of encouraging inherently cleaner energy systems. While many other nations may lack the financial resources to acquire expensive add-on technologies, most would deploy technologies which are both more efficient and are inherently lower emitting. And while these same countries lack resources to develop such technology themselves, they will purchase it from United States companies if it is available. A strong Federal signal to continue development of inherently cleaner power systems will result in lower global emissions of several pollutants.

Other technologies

The draft guidance suggests that other non-ammonia based systems may be available for add-on NOx control for combustion turbines. While such technologies have been under development for some time, they have not been applied to any system comparable in size or operating conditions to today=s new large combined cycle powerplants. In addition, they are projected to cost four times as much as, and have much greater parasitic power requirements than, SCR. Thus, even if deployed, the cost issue for this technology suggests that total system emissions could actually increase as the units drop in the dispatching order or are not deployed.

Recommendations for improvements in the Draft Guideance

The key issue in the draft guidance is not its technical shortcomings, which are relatively minor, but rather its administrative shortcomings. EPA=s approach imposes a significant and unnecessary burden upon permit applicants to prove, case-by-case, the points the Agency has demonstrated generically in the guidance. Rather than face protracted negotiations with a State permitting authority, with the additional

uncertainty of EPA=s retained authority to Asecond-guess,@ project proponents are more likely either to include SCR in the plant design, or not propose a new plant at all. If SCR is required, then the tradeoff for a marginally reduced NOx emission rate from the turbine would be a higher cost system which could be lower in the dispatching order, with the associated higher emissions from dirtier generation from other plants. If the turbine is not built at all, an opportunity for cleaner generation is lost, and power would come from dirtier generating units. Either scenario is undesirable.

A two part solution would resolve this dilemma. The first part is for EPA to exercise its clear authority to recognize the bifurcated nature of turbine technology by establishing two categories of combined cycle combustion turbines: first, newer designs which are more efficient and emit below 10 ppmv; and second, the older designs which are relatively less efficient and emit, without add-on controls, about 25 ppmv.

Once these two categories are identified, then the guidance document could identify minimum BACT requirements for each, much as it did at the beginning of the draft document. The difference is that the guidance would not create a rebuttable presumption that SCR is BACT for the inherently cleaner class of combined cycle combustion turbines. For those systems, the guidance would provide that the minimum level of BACT is proper operation and maintenance of the low NOx combustion system.

EPA=s current mechanisms for conveying information on technology improvements to permitting authorities would continue to communicate advances in the performance of inherently low emission combustion turbines. Hence the bifurcated categories (traditional turbines and inherently low NOx turbines) would proceed on separate but parallel paths toward continued reductions in allowable emissions over time.

This two-step approach retains State permitting agency ability to require more stringent controls on the cleaner category of turbines where local conditions warrant, as the Clean Air Act clearly contemplates, while clearly indicating that EPA will accept effective operation of the built-in NOx control system as BACT. In most situations, this approach would relieve the permit applicant from the responsibility of proving the points already demonstrated by EPA, thus expediting permitting of new generation needed to insure electricity reliability. These revisions would also make the guidance flexible enough to accommodate additional technologies in the future.